Application Number	Application/Control No.	Applicant(s)/Patent under Reexamination	
	10/643,457	HALLA ET AL.	
	Examiner	Art Unit	
	John P. Leubecker	3739	

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/643,457	08/19/2003	Brian Lester Halla	08211/0200237-US0/P05501	4123

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EXAMINER	
LEUBECKER, JOHN P	
ART UNIT	**PAPER NUMBER**
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10/18/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/643,457	HALLA ET AL.	
	Examiner	Art Unit	
	John P. Leubecker	3739	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 July 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *35-39 and 46-63* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *35,37-39,46-59 and 61-63* is/are rejected.

7)☒ Claim(s) *36 and 60* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *7/9/07, 7/20/07 & 8/3/07*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 55 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

As to claim 55, recitation of a "substrate" in addition to (i.e., "the capsule endoscope further includes a substrate...") the previously claimed "semiconductor material" (claim 46) ambiguously suggests two separate elements, wherein the specification suggests that these are one in the same (e.g., semiconductor substrate 301). This rejection is further explained in the Response to Arguments section below.

Claim Rejections - 35 USC § 103

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

4. Claims 35, 38, 39, 46-48, 50-59 and 62-63 are rejected under 35 U.S.C. 103(a) as being unpatentable over Meron et al. (US 2002/0109774) in view of McKenna et al. (U.S. Pat. 6,261,226) and further in view of Yegnashankaran (U.S. Pat. 6,881,943).

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37

CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). This rejection might also be overcome by showing that the reference is disqualified under 35 U.S.C. 103(c) as prior art in a rejection under 35 U.S.C. 103(a). See MPEP § 706.02(l)(1) and § 706.02(l)(2).

Referring mainly to Figures 5-7, and as relevant to claims 46, 47, 50, 51, 52, 58, Meron et al. disclose a CE comprising a capsule (60) having a curved contour shape (Fig.6) and further including a shell (not numbered but shown as the cross-hatched oval in Fig.6) which includes one or more sensors (64, 64', 64''). Illuminators (63) are associated with each sensor.

Meron et al. fails to disclose that the sensors are curved to the shape of the contour of the shell and include a semiconductor material.

McKenna et al. disclose a device in the pertinent art (endoscopes) having a similar sensor configuration (note plurality of circumferentially facing imaging sensor arrangements 55 in Figure 4) for substantially the same purpose (e.g., 360 degree viewing). Additionally, illuminators (90) are associated with each image sensor. In addition, McKenna et al. teach an alternative embodiment shown in Figures 18-20 wherein elements of the sensors are arranged in continuous bands around the circumference of the wall of the endoscope (Figs.18-20), providing

sensors curved to shape to the contour of the outer wall. This embodiment also includes illuminators (330) associated with the sensors. Mckenna et al. teaches that such arrangement allow viewing of "substantially all locations disposed radially" of the bands (col.21, lines 9-12), which inherently include areas outside of the overlapping field of views of the embodiment with separate spaced apart image sensors (note triangular regions between the field of view cones 65 in Figure 4 of Mckenna et al. and in Figure 2B of Meron et al.). This will only improve the nature of the 360 degree viewing and allow elimination of distortion at the edges of such wide fields of view. In view of this teaching, it would have been obvious to one of ordinary skill in the endoscope art at the time of the invention to have considered a sensor arrangement curved around the circumference of Meron et al. as an obvious alternative to the flat, spaced apart sensors to provided a greater degree of 360 degree viewing, as taught by Mckenna et al. One of ordinary skill would also readily recognize that such modification would appear to reduce the amount of space required to accommodate separate, flat imaging sensor (Figs. 6 and 7) by disposing the sensors on the shell wall and following the contours of the shell.

And although the Examiner could probably argue that the CCD elements of McKenna et al. inherently include a semiconductor material since the ordinarily skilled artisan would recognize that CCDs are conventionally constructed on such, Yegnashankaran is cited as evidencing that such construction is known (note col.1, lines 6-16, for example). Thus, it would have been obvious to one of ordinary skill in the art to have formed the CCD elements of the Meron et al./Mckenna et al. combination proposed above in a conventional manner, which would include a semiconductor material.

As to claims 48, 53 and 54, as Meron et al. and McKenna et al both teach, a lens (62,Meron et al. and col.20, line 67 to col.21, line 1 of Mckenna et al.) covers the sensors. Such lens, by placement over the sensors will inherently cover the shell holding the sensors, and will meet the limitations of a lens (claim 48), "an outer shell that covers at least a portion of the shell" (claims 53), and "a covering that is applied over at least a portion of the shell) (claim 54).

As to claim 47, imaging sensors are disclosed in both Meron et al. and McKenna et al., yet Mckenna et al. teach other sensors can be used (col.14, lines 18-38).

As to claims 55-57, the Examiner takes the position that, since image sensor pixel elements (such as 322 in Figures 18-20 in McKenna et al.) are not free standing elements that have to be individually arranged but are always formed together on a substrate (especially in imaging sensors), that these elements are inherently formed on a substrate that is sufficiently thin to be formed around the wall of the endoscope. In addition, the semiconductor material used to make the image sensor, as taught by Yegnashankaran would anticipate a "substrate". Furthermore, regarding claims 56 and 57, although it is assumed that the semiconductor wafer taught by Yegnashankaran is made of silicon (since this is most common), Yegnashankaran verifies this in column 4, line 41. Furthermore, the thickness of the wafer, in order to be placed in a curved configuration (col.1, lines 10-16) is one mil (col.3, lines 12-14). Although Meron et al./Mckenna et al. does not teach the particulars (e.g., materials, size, etc.), it would be obvious to use what is known in the art, as taught by Yegnashankaran.

As to claims 35, 38, 39, 59, 62 and 63, since Meron et al. and Mckenna et al. fail to teach the specifics of forming the curved image sensing element, neither teach a "support" as claimed in claims 35 and 59. Although it could be argued that an image sensor substrate (wafer), in and

of itself, is of no use unless connected to operation and processing circuitry, which is usually done via a circuit board (which would anticipate a support), one of ordinary skill, to reduce the Meron et al./Mckenna et al. device to practice, would turn to the prior art to "fill in the gaps". Yegnashankaran teaches a curved image sensor (Fig.9, 914,918) secured to a "support" (interconnect layer 912). Interconnect layer (912) forms a circuit board since it conducts voltages to and signals away from the image sensor (col.6, lines 21-23). Without any explanation by Meron et al. and Mckenna et al. as to how to implement curved image sensor about the shell, one would obviously consider what is known in the art, and particularly what is taught by Yegnashankaran.

5. Claims 35, 38, 39, 46-48, 50-59, 62 and 63 are rejected under 35 U.S.C. 103(a) as being unpatentable over Meron et al. in view of McKenna et al. and further in view of Koshio (U.S. Pat. 6,881,943).

Referring mainly to Figures 5-7, and as relevant to claims 46, 47, 50, 51, 52, 58, Meron et al. disclose a CE comprising a capsule (60) having a curved contour shape (Fig.6) and further including a shell (not numbered but shown as the cross-hatched oval in Fig.6) which includes one or more sensors (64, 64', 64''). Illuminators (63) are associated with each sensor.

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McKenna et al. disclose a device in the pertinent art (endoscopes) having a similar sensor configuration (note plurality of circumferentially facing imaging sensor arrangements 55 in Figure 4) for substantially the same purpose (e.g., 360 degree viewing). Additionally,

illuminators (90) are associated with each image sensor. In addition, McKenna et al. teach an alternative embodiment shown in Figures 18-20 wherein elements of the sensors are arranged in continuous bands around the circumference of the wall of the endoscope (Figs.18-20), providing sensors curved to shape to the contour of the outer wall. This embodiment also includes illuminators (330) associated with the sensors. Mckenna et al. teaches that such arrangement allow viewing of "substantially all locations disposed radially" of the bands (col.21, lines 9-12), which inherently include areas outside of the overlapping field of views of the embodiment with separate spaced apart image sensors (note triangular regions between the field of view cones 65 in Figure 4 of Mckenna et al. and in Figure 2B of Meron et al.). This will only improve the nature of the 360 degree viewing and allow elimination of distortion at the edges of such wide fields of view. In view of this teaching, it would have been obvious to one of ordinary skill in the endoscope art at the time of the invention to have considered a sensor arrangement curved around the circumference of Meron et al. as an obvious alternative to the flat, spaced apart sensors to provided a greater degree of 360 degree viewing, as taught by Mckenna et al. One of ordinary skill would also readily recognize that such modification would appear to reduce the amount of space required to accommodate separate, flat imaging sensor (Figs. 6 and 7) by disposing the sensors on the shell wall and following the contours of the shell.

And although the Examiner could probably argue that the CCD elements of McKenna et al. inherently include a semiconductor material since the ordinarily skilled artisan would recognize that CCDs, as well as many other sensor elements, are conventionally constructed on such, Koshio is cited as evidencing that it is known to form sensors on silicon chips (note col.18, line 64 to col.19, line 3). Thus, it would have been obvious to one of ordinary skill in the art to

have formed the CCD elements of the Meron et al./Mckenna et al. combination proposed above in a conventional manner, which would include a semiconductor material.

As to claims 48, 53 and 54, as Meron et al. and McKenna et al both teach, a lens (62,Meron et al. and col.20, line 67 to col.21, line 1 of Mckenna et al.) covers the sensors. Such lens, by placement over the sensors will inherently cover the shell holding the sensors, and will meet the limitations of a lens (claim 48), "an outer shell that covers at least a portion of the shell" (claims 53), and "a covering that is applied over at least a portion of the shell) (claim 54).

As to claim 47, imaging sensors are disclosed in both Meron et al. and McKenna et al., yet Mckenna et al. teach other sensors can be used (col.14, lines 18-38).

As to claims 55-57, the Examiner takes the position that, since image sensor pixel elements (such as 322 in Figures 18-20 in McKenna et al.) are not free standing elements that have to be individually arranged but are always formed together on a substrate (especially in imaging sensors), that these elements are inherently formed on a substrate that is sufficiently thin to be formed around the wall of the endoscope. In addition, the semiconductor material used to make the image sensor, as mention above, would anticipate a "substrate". Furthermore, regarding claims 56 and 57, Koshio mentions that the silicon material with the sensor formed thereon is between 10 and 150 micrometers to impart flexibility. Although Meron et al./Mckenna et al. does not teach the particulars (e.g., materials, size, etc.), it would be obvious to use what is known in the art, as taught by Koshio, to realize the structure of Meron et al in view of Mckenna et al.

As to claims 35, 38, 39, 59, 62 and 63, since Meron et al. and Mckenna et al. fail to teach the specifics of forming the curved image sensing element, neither teach a "support" as claimed

in claims 35 and 59. Although it could be argued that an image sensor substrate (wafer), in and of itself, is of no use unless connected to operation and processing circuitry, which is usually done via a circuit board (which would anticipate a support), one of ordinary skill, to reduce the Meron et al./Mckenna et al. device to practice, would turn to the prior art to "fill in the gaps". Koshio teaches a curved sensor (14, Fig.13) secured to a "support" (21). Support (21) forms a circuit board (col.7, lines 1-13). Without any explanation by Meron et al. and Mckenna et al. as to how to implement curved image sensor about the shell, one would obviously consider what is known in the art, and particularly what is taught by Koshio.

6. Claims 37 and 61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Meron et al. in view of McKenna et al. and Yegnashankaran and further in view of Inaike et al. (U.S. Pat. 4,508,766).

As described immediately above, the obvious combination of Meron et al., Mckenna et al. and Yegnashankaran describe the claimed combination but fail to provide the specifics for the circuit board (interconnect layer 912) in which the image sensor is attached. Again, to reduce the device to practice, one of ordinary skill would turn to the prior art to "fill in the gaps". Inaike et al. teaches that flexible circuit board substrates are typically and conventionally made from a laminate of polyimide and copper layers. Given no other information as to the make-up of the "interconnect layer 912", it would have been obvious for one of ordinary skill in the art to have used what is conventional for this structure.

7. Claims 37 and 61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Meron et al. in view of McKenna et al. and Koshio and further in view of Inaike et al. (U.S. Pat. 4,508,766).

As described immediately above, the obvious combination of Meron et al., Mckenna et al. and Koshio describe the claimed combination but fail to provide the specifics for the circuit board (21) in which the image sensor is attached. Again, to reduce the device to practice, one of ordinary skill would turn to the prior art to "fill in the gaps". Inaike et al. teaches that flexible circuit board substrates are typically and conventionally made from a laminate of polyimide and copper layers. Given no other information as to the make-up of the circuit board (21), it would have been obvious for one of ordinary skill in the art to have used what is conventional for this structure.

8. Claim 49 is rejected under 35 U.S.C. 103(a) as being unpatentable over Meron et al. in view of McKenna et al. and Yegnashankaran and further in view of Yu (U.S. Pat. 6,300,612).

The combination of Meron et al./McKenna et al./Yegnashankaran discloses an image sensor made from an inorganic semiconductor (e.g., silicon). Yu teaches that image sensors made from organic semiconductors have been contemplated (note title), are at least an alternative to, if not equivalent, inorganic technology (col.2, line 46 to col.3, line 25), and has advantages over inorganic technology (col.3, lines 41-49). It would have been obvious to one of ordinary skill in the art to have made the imaging sensor in the above described combination from an organic semiconductor in view of the teachings of Yu.

9. Claim 49 is rejected under 35 U.S.C. 103(a) as being unpatentable over Meron et al. in view of McKenna et al. and Koshio and further in view of Yu (U.S. Pat. 6,300,612).

The combination of Meron et al./McKenna et al./Koshio discloses an image sensor made from an inorganic semiconductor (e.g., silicon). Yu teaches that image sensors made from organic semiconductors have been contemplated (note title), are at least an alternative to, if not equivalent, inorganic technology (col.2, line 46 to col.3, line 25), and has advantages over inorganic technology (col.3, lines 41-49). It would have been obvious to one of ordinary skill in the art to have made the imaging sensor in the above described combination from an organic semiconductor in view of the teachings of Yu.

Response to Arguments

10. Applicant's arguments filed July 19, 2007 have been fully considered but they are not persuasive.

Regarding the rejection under 35 U.S.C. 112, second paragraph, according to the specification, the only way the sensor "includes a semiconductor material" is if one interprets the semiconductor substrate as being part of the sensor (e.g., page 6 of the specification, lines 6-20). Nowhere does the specification explicitly state that the *sensor itself* (e.g., array of optical elements 302, photo-sensitive detector elements 402, etc.) "includes a semiconductor material" and that such semiconductor material is "curved to shape to the contour". Only taking the semiconductor substrate as an integral part of the sensor can one say that the sensor "includes a semiconductor material that is curved to shape to the contour". This is how claim 46 was interpreted. The examiner does agree that specification supports the sensor being curved (note

sensor 312, Fig.3(b), page 7, line 3) and formed on a semiconductor substrate which can be curved (311, Fig.3(b), page 7, lines 1-2).

Thus, by reciting in claim 55 that the device "*further includes* a substrate" that includes the sensor, it appears to be redundantly reciting an element (i.e., semiconductor material) that has been previously recited. Although Applicant (in the arguments filed July 19, 2007, page 7, third full paragraph) fails to explicitly address the Examiner's concern or give explicit indication as to how claims 46 and 55 are to be interpreted with respect to this concern, it appears that Applicant might be interpreting the substrate and semiconductor material as being the same element. Therefore, the Examiner suggests amending claim 55 to read –The device of Claim 46, wherein the semiconductor material is a substrate, wherein the substrate is formed sufficiently thin that it can be shaped to the contour.—or, even better, to read –The device of Claim 46, wherein the semiconductor material is formed sufficiently thin that it can be shaped to the contour.--

Regarding the Mckenna reference, Applicant argues that "in McKenna, the CCD sensors themselves are not curved" but are instead "flat". Applicant refers to Figures 22-24 of McKenna as showing "flat" sensors.

Firstly, it appears Applicant is equating each discrete pixel element of McKenna's image sensor to the "sensor" claimed. This is not a fair comparison since Applicant's sensor, at least in one embodiment, encompasses "an array of optical elements 302" (page 6, second full paragraph of the specification). Thus, the Examiner is allowed to interpret the "sensor" of McKenna as the array of pixel elements, as shown in Figures 18-20. And as pointed out in the rejection, this array of pixel elements, whether made up of tiny flat portions or not (Applicant surmises that this

is the case but fails to provide any evidence supporting this assumption) forms a curved surface (note Figures 18-20).

Secondly, even if Applicant could prove that each pixel element (e.g., 322, Fig.20) was indeed flat and, more importantly, even if the curved arrangement of such flat pixel elements failed to meet the limitations of the claims (an they don't), it is noted that Applicant's specification does not describe the smallest discrete sensing elements of the array of the sensor in such a manner as to give each smallest discrete sensing element the ability to "curve". The *array* of elements may be flexed (page 7, lines 1-3) and the substrate that the array is formed on may be flexed (page 7, lines 1-3), but there is not explicit indication that each element in the array is in itself "flexed" or "curved".

Although Applicant points to Figures 22-24 of McKenna to evidence that the sensors are "flat", it must be pointed out that these Figures appear to be a cross section of the tube in a plane represented by the page of Figure 1. Even if the sensors (70) curved along the tube wall, the specific cross section as shown in Figure 1 will appear straight. In addition, Figures 22-24 show the image sensors (55) which is referring to the embodiment of Figure 1. There is no implication in the description of Figure 1 that the image sensors are actually curved.

Allowable Subject Matter

11. Claims 36 and 60 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Information Disclosure Statement

12. It is noted that the Information Disclosure statement filed July 20, 2007 lacked copies of the U.S. Pat. applications listed. Thus, this paper was X-ed through. However, the applications listed on Applicant's Information Disclosure statement filed August 3, 2007 have been considered since copies of such application have been received.

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US 6752888 B2	Hosier; Paul A. et al.
US 6165813 A	Quinn; Kraig A. et al.
US 5510273 A	Quinn; Kraig A.
US 20060185165 A1	Vafi; Habib et al.
US 6791072 B1	Prabhu; Ashok
US 20010020671 A1	Ansorge, Fank et al.
US 6051877 A	Usami; Mitsuo et al.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John P. Leubecker whose telephone number is (571) 272-4769. The examiner can normally be reached on Monday through Friday, 6:00 AM to 2:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Linda C.M. Dvorak can be reached on (571) 272-4764. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/John P. Leubecker/
Primary Examiner
Art Unit 3739

jpl